

Brazing

SOV/3720

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AVAILABLE: Library of Congress

VK/pw/jb  
7-12-60

Card 3/3

BACHURIN, N.I., inzh.; VOLKOV, S.S., inzh.; GORODETSKIY, S.S., prof., doktor tekhn. nauk; GUSEV, S.A., dotsent, kand. tekhn. nauk; ZHUKHOVITSKIY, B.Ya., dots., kand. tekhn. nauk; IVANOV-SMOLENSKIY, A.V., dots., kand. tekhn. nauk; KIFER, I.I., dots., kand. tekhn. nauk; KORYTIN, A.A., starshiy pre-podavatel'; KULIKOV, F.V., dots.; NIKULIN, N.V., dots., kand. tekhn. nauk; PODMAR'KOV, A.N., dots.; PRIVEZENTSEV, V.A., prof., doktor tekhn. nauk; RUMSHINSKIY, L.A., dots., kand. fiz.-mat. nauk; SOBOLEV, V.D., dots., kand. tekhn. nauk; URLAPOVA, M.N., inzh.; TIKHOMIROV, P.M., dots., kand. tekhn. nauk; FEDOROV, A.A., dots., kand. tekhn. nauk; CHUNIKHIN, A.A., dots., kand. tekhn. nauk; CHILIKIN, M.G., prof., glav. red.; GOLOVAN, A.T., prof., red.; GRUDINSKIY, P.G., prof., red.; PETROV, G.N., prof., doktor tekhn. nauk, red.; FEDOSEYEV, A.M., prof., red.; ANTIK, I.V., inzh., red.; BORUNOV, N.I., tekhn. red.

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NIKOLAYEV, A.A., inzh.

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no.2:14-16 F '63. (MIRA 16:2)

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(Solder and soldering)

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1. Nachal'nik spasatel'noy sluzhby oblastnogo komiteta Dobrovol'nogo  
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(Volgograd Province--Lifesaving stations)

SHPAGIN, M. (Moskva); ~~KULIKOV, G.~~ (Moskva)

The brightest projector. Izobr. i rats. no. 11:22-23 N '62. (MIRA 15:12)  
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KULIKOV, Georgiy Aleksandrovich; NOVOSPASSKIY, V.V., redaktor; RAKOV, S.I.,  
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[Through the Crimean State Preserve] Po krymskomu Zapovedniku.  
Moskva, Izd-vo VTsSPS Profizdat, 1956, 12 p. (MLRA 9:6)  
(Crimean State Preserve)



KULIKOV, G. A.

Compound units for testing and adjusting electric measuring instruments. Izv. tekhn. no.10:45-47 0 '62.

(MIRA 15:10)

(Electric meters—Testing)

*Account 6, 1977*  
ALEKSEYEV, Zosim Kirillovich, kand. tekhn.nauk, dots.; RUZHENTSEV, S.P.,  
prof., retsenzent.; KULIKOV, G.A., kand. tekhn. nauk, dots.;  
POLYAKOV, V.S., kand. tekhn.nauk, red.; VAGIL'YEVA, V.P., red. izd-va.;  
POL'SKAYA, R.G., tekhn. red.

[Manual on the analysis and design of reduction gears] Rukovodstvo  
po raschetu i proektirovaniu reduktorov. Moskva, Gos. nauchno-tekhn.  
izd-vo mashinostroit. lit-ry, 1958. 359 p. (MIRA 11:12)  
(Gearing)

ACC NR: AI7007081

SOURCE CODE: UR/0048/66/030/010/1685/1689

AUTHOR: Vernov, S. N.; Khristiansen, G. B.; Abrosimov, A. T.; Atrashkevich, V. B.; Belyayeva, I. P.; Vodenoyov, O. V.; Kulikov, G. B.; Nechin, Yu. A.; Solov'yeva, V. Y.; Fomin, Yu. A.; Khrenov, B. A.

ORG: none

TITLE: Phenomenological characteristics of broad atmospheric showers with a fixed number of  $\mu$ -mesons and electrons /Paper presented at the All-Union Conference on Cosmic Radiation Physics, Moscow, 15-20 Nov 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 10, 1966, 1685-1689

TOPIC TAGS: mu meson, cosmic radiation

SUB CODE: 20

ABSTRACT: In an earlier work by Vernov et al (Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 29, 1676, 1965), results obtained in a study at an installation of Moscow State University on broad atmospheric showers with zenith angles of 0-30° were reported. These results included the distribution of showers with a fixed number of electrons  $N_e$  with respect to the number of high-energy mesons  $N_\mu$  and the age parameter  $S$ , distribution of showers with a fixed  $N_\mu$  with respect to  $N_e$  and  $S$ , and the coefficients of the correlation between  $S$  and the fluxes of electrons and  $\mu$ -mesons. In the work reported in this instance, the same relations were determined for broad atmospheric showers with zenith angles of 30-45°. The fluctuations of  $N_\mu$ ,  $S$ , and  $N_e$ , observed for an effective atmospheric depth of 1240 g/cm<sup>2</sup>, were the same as those for vertical showers established in the earlier work. To determine the differences due to an increase in

Cord 1/2

ACC NR: AP7007081

the effective atmospheric depth of  $200 \text{ g/cm}^2$ , calculations must be carried out with greater statistical precision. When results of the theoretical calculations on characteristics of broad atmospheric showers at  $1240 \text{ g/cm}^2$  become available, the experimental data reported will be useful for the determination of the composition of primary cosmic radiation in the superhigh-energy range. [JPRS: 39,058]  
Orig. art. has: 5 figures, 2 formulas and 1 table.

Card 2/2

KULIKOV, G.B.

(8)

31519  
S/627/60/002/000/001/027  
D299/D304

3.2410(1558, 2205, 2705, 2805)

AUTHORS: Vernov, S. N., Christiansen, G.B., Abrosimov, A. T.,  
Goryunov, N. M., Dmitriyev, V. A., Kulikov, G. B.,  
Nezhin, Yu. A., Sokolov, S. P. (deceased), Solov'yeva,  
V. I., Solov'yov, K. I., Strugala'kiy, Z. S., and  
Khrenov, B. A.

TITLE: General description of the setup used for studying ex-  
tensive air showers and the provisional results ob-  
tained

SOURCE: International Conference on Cosmic Radiation. Moscow,  
1959. Trudy. v. 2. Shirokiye atmosferynoye livni i kas-  
kadnyye protsessy, 5-16

TEXT: A complex experimental setup was installed at Moscow State  
University, consisting of a simultaneously operating physical appa-  
ratus plus the corresponding radiotechnical equipment and photo-  
graphic recording devices. The setup incorporates over 5000 Gei-  
ger-Muller counters (forming a hodoscope), about 150 ionization

Card 1/1

General description of the setup...

S/627/5519/002/000/001/027  
D299/D301

chambers and a large diffusion chamber. The setup is designed for a comprehensive and simultaneous investigation of all the basic components (electrons and photons, nuclear-active particles and  $\mu$ -mesons) of extensive air showers at sea level. The setup was designed in 2 different configurations: the first at the end of 1957, and the second at the beginning of 1959. Below, only the results obtained by means of the first setup are considered. The setup was located in a special building and in 10 mobile laboratories. The showers were registered by the system of hodoscoped counters. Part of the counters were shielded (those for detecting the nuclearactive particles and the  $\mu$ -mesons) and the other counters were not shielded. The ionization chambers served to determine the lateral distribution of the electron-photon component and of the nuclearactive component. The microstructure of the electron component was studied by means of the diffusion chamber. Special measures were taken to ensure continuous and prolonged operation of the setup. The main units of the setup were automatically controlled, in particular the supply units and the photography system. The operation of the setup (as a whole) was controlled (triggered) by a selection system; in parti-

Card 2/7

General description of the setup ... <sup>31519</sup>  
S/627/60/002/000/001/027  
D299/D304

cular, the showers were selected in accordance with the density of the electron flow and of the  $\mu$ -mesons. The setup was in operation for about 2500 hours, yielding a large amount of experimental data which are still being processed. The probability theory (Baye's theorem) was used for determining the (x,y)-axes and the number of particles N of the shower; in addition the distribution function  $f(r)$  as well as other distribution functions were determined (r denoting distance). The values of x, y and N were found by means of a special electronic simulator. The density distribution of electrons and mesons was determined by means of formula

$$w(\rho) = \prod_{i=1}^m [1 - \exp(-\rho\sigma_i)]^{m_i} \cdot \exp[-\rho\sigma_i(n_i - m_i)]$$

where  $m_i$  is the number of counters which operate over an area  $\sigma_i$ , and  $n_i$  - the overall number of such counters. The energy E of the electron-photon component was determined by means of ionization  
Card 3/7

8

General description of the setup ...

31519  
S/627/50/002/000/001/027  
D299/D704

chambers, shielded with lead (up to 5 cm thick). A very comprehensive picture of the particles and energies was obtained for showers whose axes fell within the system of 128 cubic detection chambers. The setup permits observing the central part of an atmospheric shower, whereby its several layers are simultaneously observed; this corresponds to the individual observation of the electron-photon, nuclearactive and  $\mu$ -meson components. The processed material already yielded a fairly detailed picture of the structure of extensive air showers at sea level. Thus, the lateral distribution of particle flow in the individual showers was ascertained. It was found that the lateral distribution varies (in the 1 to 25 m range) from shower to shower; the average distribution is, in the range of 5 cm to 100 m, as follows:

+

$$\left( \frac{K_1 N}{r^{0.6}} \right) K_1 = 3.3 \cdot 10^{-3}, 0.05 < r < 0.3 \text{ m}$$

$$\rho(r) = \left\{ \right.$$

(cont'd)

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General description of the setup ...

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S/627/60/002/000/001/027  
D299/D304

$$\left( \frac{K_2 N}{r} \cdot e^{-\frac{r}{60}} \right), K_2 = 2 \cdot 10^{-3}, 0.3 < r < 100 \text{ m}$$

The lateral distribution of the electron-photon components also fluctuates from shower to shower. At distances smaller than 1.5 m, these fluctuations are particularly sharp. The nuclearactive components also exhibit considerable energy fluctuations. The fluctuations in the high-energy  $\mu$ -mesons were not yet analyzed. The energy of the electron-photon component  $E_{eph}$  was calculated for a shower with number of particles equal to  $(2.7 \pm 0.2) \cdot N_0$ , where  $0$  is the critical energy for air (72 Mev). The above value was obtained with an accuracy of appr. 30%. It was found that the energy of the nuclearactive component  $E_n \approx (0.5 \text{ to } 1.0) E_{eph}$ . This value is, however, subject to considerable fluctuations and the experimental data are as yet insufficient to determine the contribution of the

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General description of the setup...

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S/627/60/002/000/001/027  
D299/D304

nuclearactive component in showers. In addition, the above-men-  
tioned fluctuations severely delimit the choice of a theoretical  
model for the development of showers. Particular attention was de-  
voted to the structure of the shower in the immediate vicinity of  
its axis, where the particles of highest (for the particular show-  
er) energy should be concentrated. This led to the discovery of a  
new effect: Groups of particles (from 4 to 20) travel in narrow  
beams (not exceeding 8 cm in diameter) in the neighborhood of the  
axis (or along the axis itself), whereby their lateral distribution  
shows that the beams are not due to Poisson fluctuations. The new  
effect can be explained as follows: Either the beam is the core of  
a "young" electron-photon shower which originates from a high-ener-  
gy  $\pi^0$ -meson at a certain distance from the apparatus, or the beam  
consists of  $\mu$ -mesons. These two possibilities are discussed. The  
observed irregularity in the lateral distribution of  $\mu$ -mesons in  
the vicinity of the shower axis might be related to the new effect.  
There are 6 figures and 2 tables.

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General description of the setup ...

31519  
S/627/60/002/000/001/027  
D299/D304

ASSOCIATION: Nauchno-issledovatel'skiy institut yadernoy fiziki  
MGU, Moskva (Scientific Research Institute of Nuclear Physics Moscow State University, Moscow)

Card 7/7

SOV/137-57-11-21690

Translation from: Referativnyy zhurnal, Metallurgiya, 1957, Nr 11. p 150 (USSR)

AUTHORS: Patskevich, I. R. , Kulikov, G. D. , Pinchuk, I. S.

TITLE: An Investigation of the Process of Hardfacing by Means of Automatic Vibrating-electrode Arc Welding (Issledovaniye protsessa avtomaticheskoy vibrodugovoy naplavki)

PERIODICAL: V sb. : Vosstanovleniye iznoshennykh detaley avtomat. vibrodugovoy naplavkoy. Chelyabinsk, 1956, pp 64-98

ABSTRACT: A study of oscillograms of current and voltage conditions in the course of hardfacing operations performed with the aid of vibrating electrodes demonstrated that this process is essentially an arc process. It differs from standard arc-welding hardfacing procedures only with regard to the employment of vibrating electrodes and a cooling fluid; therefore, it would be more correct to refer to it as a vibrating-electrode arc-welding method (VEAW). Oscillograms indicate that every electrode vibration includes a period of electric-arc discharge, an idle period, and a short-circuit period. The greater part of the heat energy (82-94. 3%) is generated during the

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SOV/137-57-11-21690

An Investigation of the Process of Hardfacing (cont.)

period of the arc discharge. The idle period has an adverse effect upon the fusion characteristics of the electrode and the quality of bonding between the deposited metal and the parent metal. Idle periods may be eliminated by employing a welding generator as a source of power. In order to stabilize the process it is desirable that generators with good "surge-and-dip" characteristics be utilized. Reverse polarity must be employed during VEAW. The vibration of the electrode ensures the stability of the process by providing frequent excitation of the arc discharge (100 per second). In addition, the vibration causes the electrode metal to be transferred in small quantities (at the instant when the electrode contacts the component), thus favorably affecting the formation of beads. The cooling fluid reduces the effects of heat on the component, increases the rate of cooling of the metal, and protects the molten metal from the action of air. The selection of the area on the component to which the coolant is supplied, and the manner in which this is accomplished, are factors of great importance. The process of propagation of heat in the parent metal during VEAW may be schematically described by the action of a rapidly moving point source of heat traveling along the surface of a semi-infinite body. Structural changes occurring during VEAW essentially do not differ from changes taking place in a heat-affected zone during standard arc-welding procedures

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SOV/137-57-11-21690

• An Investigation of the Process of Hardfacing (cont.)

Large temperature gradients and high rates of cooling in the process of VEAW favor the formation of hardened structures, which frequently results in cracking of the heat-affected zone.

V. K.

Card 3/3

*Kulikov, G. D.*

124-1957-10-12200

Translation from: Referativnyy zhurnal, Mekhanika, 1957, Nr 10, p 137 (USSR)

AUTHORS: Bakshi, O. A., Kulikov, G. D.

TITLE: Investigation of the Deformation During Automatic "Electronic-Tornado" Welding (Issledovaniye deformatsii pri avtomaticheskoy vibrodugovoy naplavke)

PERIODICAL: V sb.: ~~Vosstanovleniye~~ iznoshennykh detaley avtomat. vibrodugovoy naplavkoy. Chelyabinsk, 1956, pp 99-125

ABSTRACT: It is indicated that the deformation observed during automatic "electronic-tornado" welding of cylindrical parts is several times smaller than that occurring with other methods. They are however still considered because of local plastic deformation. Also, not only longitudinal deformations, but also warping of samples occur. Utilizing the conception of "shrinkage forces" the Authors give a theoretical explanation of the warping process of parts as a result of welding along helical lines. Experiments conducted with the welding of rolls (made of steel "20") 20 to 50 mm in diameter with a steel "60" welding wire, and with a vibrational frequency of 100 cps and an amplitude of 1.5 to 2.0 mm, lead to the conclusion that the deformations increase with the lengthening of the welding

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124-1957-10-12200

Investigation of the Deformation During Automatic (cont.)

seam and the enlargement of the initial eccentricity, and also as a result of preliminary cold straightening, but decrease with increased diameter of samples and an increased amount of cooling fluid.

G. A. Nikolayev

Card 2/2



KULIKOV, G. D.

AID P - 5053

Subject : USSR/Engineering-Welding

Card 1/2 Pub. 107-a - 2/9

Authors : Patskevich, I. R. and G. D. Kulikov, (Chelyabinsk Polytechnic Institute).

Title : Research in automatic arc bonding by vibrating electrodes and the implementation of this method.

Periodical : Svar. proizv., 5, 6-12, My 1956

Abstract : A new method of bonding certain machine parts of machines (tractors) by vibrating electrodes was developed sometime in 1951-52 at the Chelyabinsk Tractor Plant. However, this metal-arc overlay process has several shortcomings. The authors of this article, in the course of their investigation, have evolved a somewhat different and more efficient process of automatic metallization which they call "vibrating arc bonding". This is described and illustrated here, with reference

AID P - 5053

Svar. proizv., 5, 6-12, My 1956

Card 2/2 Pub. 107-a - 2/9

to several industrial plants where the process has been adapted. Four tables, 7 diagrams and 4 photos.

Institutions: Chelyabinsk Polytechnic Institute, Chelyabinsk Tractor Plant, (and other cooperating plants).

Submitted : No date

*KULIKOV G. D.*

135-58-1-10/23

AUTHORS:

Patskevich, I.R., Candidate of Technical Sciences, Kulikov, G.D., and Grishin, M.A., Engineers

TITLE:

~~Vibrating Arc~~ Welding of Electric Motor Shafts (Vibro-dugovaya naplavka valov elektrodvigatelya)

PERIODICAL:

Svarochnoye Proizvodstvo, 1958, Nr 1, pp 28 - 29 (USSR)

ABSTRACT:

The authors state that nearly all shafts repaired at the Stalinsk Power Plant were made of ST 5 steel and have 7 journals of different types. Their wear is 0.2 to 0.5 mm to the side. In 1956, the chair of welding at the Chelyabinsk Polytechnical Institute and the Stalinskiy energo-zavod (Stalinsk Power Plant) started collaborating on the introduction and improvement of vibro-arc welding as applied to the repair of worn out parts of electric motors. The plant assembled two special vibro-arc devices. Their arcs were fed by welding converters of the PS-300 type. A series of tests showed the preferable qualities of the Sv-08 or Sv-08A welding rods of 2 mm in diameter, ensuring good quality of weld metal, free from cracks, with a hardness of 200 to 275 Hv. Electrode vibration has a great effect on the stability of the welding process. The power plant replaced magnetic vibrators by mechanical ones, which work independent of grid voltage oscillations, and ensure a high stability of the process. This process was carried out

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135-58-1-10/23

Vibrating Arc Welding of Electric Motor Shafts

under the following conditions; arc voltage is 16 to 21 v, the rate of electrode wire feed is 20 mm/sec., the longitudinal shift of the electrode is 2.45 mm/revolution, the consumption of refrigerating liquid (4% aqueous solution of calcined soda) is 1.5 to 2.0 liter/min., the amplitude of electrode vibration is 1.5 to 2 mm. The thickness of the weld layer must be 1.5 mm. Experience has shown that consumption of labor in vibra-arc welding is 2 to 2.6 times lower than that of the hand-operated arc, and as a result the application of this method in the repair of worn-out shafts produced considerable savings. There is 1 figure and 4 Soviet references.

ASSOCIATION: Chelyabinskiy politekhnicheskiy institut (The Chelyabinsk Polytechnical Institute) Stalinskiy Energozavod (Stalinskiy Power Equipment Plant)

AVAILABLE: Library of Congress

Card 2/2

1. Shafts-Welding 2. Arc welding-Vibration processes



KULIKOV, Genrikh Danilovich; RAZIKOV, M.I., kand. tekhn. nauk, retsenzent;  
DENISOV, Yu.A., inzh., red.; DUGINA, N.A., tekhn. red.

[Built-up welding with a weaving arc] Vibrodugovaia naplavka. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1961. 53 p.  
(Nauchno-populiarnaia biblioteka rabochego-svarshchika, no.18)  
(MIRA 14:9)

(Machinery—Maintenance and repair)

KULIKOV, G. I.

Aboriculture

Shading seedlings in nurseries Les. khoz. 5 no. 6, June 1952

9. Monthly List of Russian Accessions, Library of Congress, August, 195~~1~~2 Uncl.

ZELENTSOV, G.N., inzhener; KULIKOV, G.I., inzhener.

Classification and conventional denotations of machine tools and  
attachments used in machinery industry. Standartizatsiia no.6:53-54  
H-D '56. (MIRA 10:1)

(Machine tools--Standards)



FULIKOV, G.I., AND KUSTAKOV, S.G.

"Reduction of Runoff of Detritus to Long Periods of Observations on the Basis of the Small Rivers of Azerbaydzhan," Izv. AN Az SSR, No 2, 71-80, 1953

The methods for the computation of the runoff of detritus worked out by G.I. Shamov and G.V. Lopatin for mountain rivers of Azerbaydzhan do not give the needed results. To obtain a satisfactory magnitude of the norm of runoff of suspended detritus under the conditions of the small mountain rivers of Azerbaydzhan, the authors propose, in cases where there are observations on unit turbidity and measured yields of suspended detritus, that their relation be used. (RZhGeol, No 1, 1955)

SO: Sum.No. 536, 10 Jun 55

KULIKOV, G. I.

Chemical Runoff of the Rivers of the Northeastern Part of Caucasus Minor

On the example of the rivers Akstafachay and Gyandzhachay the author investigates the annual fluctuations in the chemical composition of the water of the rivers in the northeastern part of Caucasus Minor. He critically considers the formulas presently applicable for the computation of the chemical runoff. He finally selects a formula of the type  $P = a + bQ$ , where  $P$  is the yearly chemical runoff,  $Q$  is the yearly discharge of water, and  $a$ ,  $b$  are coefficients (equal respectively to 172 and 180 for the Gyandzhachay River near the village Zurnabad). The coefficient of correlation of the equation for the investigated rivers fluctuates in the limits 0.93-0.98 and only in two cases out of ten does it drop to 0.84 and 0.86. The mineralization of the water in the rivers of the territory under consideration fluctuates in the limits 179-313 mg/liter. (RZhGeol, No. 4, 1955). Izv. AN Az SSR. No. 3, 1954, 85-99 (Azerbaydzhani resume).

SO: Sum. No. 744, 8 Dec 55 - Supplementary Survey of Soviet Scientific Abstracts (17)

RUSTAMOV, S. G., AND KULIKOV, G. I.

Muddiness of the Left Bank Tributaries of the Kura

The left bank tributaries of the Kura within the limits of Azerbaydzhani SSR produce very great erosion which wreaks severe damage on various branches of the economy of the region, mainly agriculture. About 4.8 million tons of suspended detritus is yearly carried away from area of 5298 km<sup>2</sup> by the rivers; i.e., the modulus of runoff of detritus is about 905 tons/km<sup>2</sup>. According to data of systematic observations at 14 hydro-metric stations, the author computed the runoff of suspended detritus over the period of observations, and established the mean value of this runoff over many years; he also obtained data on the monthly distribution of runoff, and derived the characteristics governing the magnitude of detritus. (RZhGeol, No. 4, 1955) Izv. AN AzSSR, No. 8, 1954, 55-66 (Azerbaydzhani resume).

SO: Sum. No. 744, 8 Dec 55 - Supplementary Survey of Soviet Scientific Abstracts (17)

RUSTAMOV, S.G.; KULIKOV, G.I.

Hydrochemical regimen of the Kura River. Dokl. AN Azerb. SSR 10  
no. 11: 787-791 '54. (MLRA 8:10)

1. Institut geografii Akademii nauk Azerbaydzhanskoy SSR. Pred-  
stavleno deystvitel'nym chlenom Akademii nauk Azerbaydzhanskoy  
SSR M.A. Kashkayem.

(Kura River--Hydrology)

KULIKOV, G.I.

Water erosion in mountainous regions of Azerbaijan. Dokl. AN Azerb. SSR 11 no.5:335-339 '55. (MIRA 9:6)

1. Institut geografii AN Azerbaydzhanskoy SSR. Predstavleno deystvitel'nym chlenom AN Azerbaydzhanskoy SSR M.A. Kashkayev.  
(Azerbaijan--Erosion)

Translation from: Referativnyy zhurnal, Geologiya, 1957, Nr 12, 15-57-12-17245  
p 76 (USSR)

AUTHORS: Rustamov, S. G., Kulikov, G. I.

TITLE: Weight of River Deposits in the Kura River Basin  
(Disregarding those of the Araks River) /Vzveshennyye  
nanosy rek basseyna Kury (bez Araksa) /

PERIODICAL: Izv. AN AzSSR, 1955, Nr 12, pp 29-50

ABSTRACT: Bibliographic entry  
Card 1/1

KULIKOV, G.I.; ZAMANOV, Kh.D.

Problem of the effect of the Mingeaur Reservoir on silt balances.  
Dokl. AN Azerb. SSR 15 no.9:839-843 '59. (MIRA 13:2)

1. Predstavleno akademikom AN Azerbaydzhanskoy SSR M.A. Kashkayem.  
(Mingeaur Reservoir--Silt)

KULIKOVA, G. N. Cand Agr Sci -- (diss) "Diseases of the sugar beet in Alma-  
Atinskaya Oblast and <sup>the control of them</sup> ~~their prevention~~." Alma-Ata, 1959. 11 pp (Uzbek Acad  
Agr Sci. Tashkent Agr Inst), 150 copies (KL, 52-59, 123)



CLASS. : U.S.S.R.  
SUBJECT : Soil Science. Tillage. Improvement. Erosion. J  
ABST. JOURN. : RZhBiol., No. 3 1958, No. 10711  
AUTHOR : Kulikov, G. P.  
INST. : Annenkovskaya Experiment Station, Ul'yankovskaya Oblast'.  
TITLE : Methods of the Tillage of Leached-Out Chernozems in  
Ul'yankovskaya Oblast'.  
ORIG. PUB. : S. Kh. Povolzh'ya, 1958, No. 6, 25-28  
ABSTRACT : Deep tillage (with and without inversion) of soils at  
Annenkovskaya Experiment Station in Ul'yankovskaya Oblast',  
produced considerably better results in the control of  
perennial rhizomous weeds. Deep tillage of soil improved  
the water conditions of the soils, specifically by in-  
creasing its water permeability. The yields of spring  
wheat were highest with subsurface plowing (without in-  
version) to the depth of 38-40 centimeters, and the yields

10: 3/2

40

COUNTRY : J  
CATEGORY :  
APS. JOUR. : RZhBiol., No. 1959, No. 10711  
AUTHOR :  
INST. :  
TITLE :  
  
ORIG. PUB. :  
  
ABSTRACT : of vetch-oats mixture with the plowing to the depth of 25-27 centimeters. Deep subsurface plowing (without inversion) proved to be more economical in the estimate of the cost of production of a unit of production in comparison with the plowing to the depth of 20-22, 25-27 centimeters with the inversion of the furrow slice. -- M.L. Yaroshenko

CARD: 2/2

*Handwritten initials*  
KULIKOV, G. P., CAND AGR SCI, "METHODS OF BASIC TREAT-  
MENT OF LEACHED CHERNOZEMS OF UL'YANOVSKAYA OBLAST." SA-  
RATOV, 1960. (MIN OF AGR RSFSR, SARATOV AGR INST). (KL,  
3-61, 225).

KULIKOV, G. P., NOTIK, S. M.

Machine-Shop Practice

Experience in the use of high-speed groove cutting., Stan. 1 instr., no. 12, 1951.

9. Monthly List of Russian Accessions, Library of Congress, March, 1952 ~~1953~~, Uncl.

KULIKOV, G.P.; KOTIK, S.M.

Introduction of high-speed slot milling. Proizv.-tekhn.inform.  
no.5:108-112 '52. (MLRA 10:3)  
(Milling machines)

Kulikov, G. P.

AID P - 5193

Subject : USSR/Engineering  
Card 1/1 Pub. 103 - 15/24  
Authors : Notik, S. M., and G. P. Kulikov  
Title : Using mineral ceramic cutters for speed cutting of metals.  
Periodical : Stan. 1 instr., 7, 39-40, J1 1956  
Abstract : The three-years experimentation of certain mineral-ceramic cutters for speed cutting of metals done at the Novochoerkassk Electric Locomotive-Building Plant im. Budenny are described. Two photos, 2 drawings and 1 table.  
Institution : As above  
Submitted : No date

PHASE I BOOK EXPLOITATION

SOV/4081

Kulikov, Georgiy Petrovich

Mineralokeramika i skorostnoye rezaniye (Ceramic Materials and High-Speed Cutting) Rostov-na-Donu, Rostovskoye knizhnoye izd-vo, 1958. 38 p. Errata slip inserted. 1,000 copies printed.

Ed.: I.V. Zharebkov; Tech. Ed.: M.V. Marinyuk.

PURPOSE: This booklet is intended for technical personnel in metal machining and toolmaking.

COVERAGE: The booklet deals with the industrial application of ceramic materials for cutting tools. According to the author the cutting properties of sintered aluminum oxide powder without a metallic binder compare favorably with, and in some instances excel, those of sintered carbides. The physical and mechanical properties of aluminum oxide powder and the construction and geometric parameters of tipped single-point tools made from this material are discussed. Recommendations for tool production and cutting

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Ceramic Materials (Cont.)

SOV/4081

regimes are made. The author is head of the Laboratory of Cutting, Novocherkasskiy elektrovostroitel'nyy zavod (Novo-cherkassk Electric Locomotive Plant). No personalities are mentioned. There are no references.

TABLE OF CONTENTS:

Physical and Mechanical Properties of Ceramic Materials	4
Construction of Single-Point Cutting Tools With Ceramic Tips	5
Production of Single-Point Cutting Tools With Ceramic Tips	10
Cutting Regimes	17
Geometrical Parameters	17
Practice of the Use of Single-Point Cutting Tools With Ceramic Tips	22

Card 2/3



SYTINSKAYA, Nadezhda Nikolayevna; KULIKOV, G.S., red.; YERMAKOVA, Ye.A.,  
tekhn. red.

[Planet Mars] Planeta Mars. Moskva, Gos. izd-vo fiziko-  
matem. lit-ry, 1962. 61 p. (Populiarnye lektsii po astronomii,  
no.12) (MIRA 15:4)

(Mars (Planet))

KAPLAN, Samuil Aronovich; KULIKOV, G.S., red.; PLAKSHE, L.Yu.,  
tokhn. red.

[Physics of stars] Fizika zvezd. Moskva, Gos. izd-vo fiziko-  
matem. lit-ry, 1961. 151 p. (MIRA 15:2)  
(Cosmic physics)

KULAGIN, S.G.; KOVBASYUK, L.D.; DAGAYEV, M.M.; LAZAREVSKIY, V.S.;  
 DEMIDOVICH, Ye.G.; BRONSHTEN, V.A.; YAKHONTOVA, N.S.(Leningrad);  
 KUROCHKIN, N.Ye.; DOKUCHAYEVA, G.D.; SHCHERBINA-SAMOYLOVA, I.S.;  
 MASEVICH, A.G.; LIPSKIY, Yu.N.; MARTYNOV, D.Ya.; ARSENT'YEV, V.V.;  
 MOROZ, V.I.; MASEVICH, A.G.; PEREL', Yu.G.; BAKULIN, P.I., otv.  
 red.; KULIKOV, G.S., red.; AKHLAMOV, S.N., tekhn. red.

[Astronomical calendar; yearbook.Variable part, 1962] Astronomicheskii kalendar'; ezhegodnik. Peremennaya chast', 1962. Red. kollegiya: P.I.Bakulin i dr. Moskva, Gos.izd-vo fiziko-matem. lit-ry, 1961. 259 p. (Vsesoyuznoe astronomo-geodezicheskoe obshchestvo, no.65) (MIRA 14:12)

1. Gosudarstvennoye astronomo-geodezicheskoye obshchestvo (for Kalugin, Kovbasyuk, Lazarevskiy, Demidovich). 2. Moskovskoye ot-deleniye Vsesoyuznogo astronomo-geodezicheskogo obshchestva (for Dagayev, Bronshten, Kurochkin).  
 (Astronomy—Yearbooks)

NAVASHIN, Mikhail Sergeyevich; MAKUTOV, D.D., red.; KULIKOV, G.S.,  
red.; PLAKSHEV, L.Yu., tekhn. red.

[Telescope of an amateur astronomer] Teleskop astronomi-  
liubitelia. Pod red. D.D.Maksutova. Moskva, Fizmatgiz, 19622  
375 p. (MIRA 15:10)

1. Chlen-korrespondent Akademii nauk SSSR (for Maksutov).  
(Telescope, Reflecting)

GURZADYAN, Grigor Aramovich; AMBARTSUMYAN, V.A., red.; MUSTEL', E.R.,  
red.; SEVERNIY, A.B., red.; SOBOLEV, V.V., red.; KULIKOV,  
G.S., red.; BRUDNO, K.F., tekhn. red.

[Planetary nebulae] Planetarnye tumannosti. Moskva, Gos.izd-vo  
fiziko-matem.lit-ry, 1962. 384 p. (MIRA 15:9)  
(Nebulae)

AGEKYAN, T.A.; VORONTSOV-VEL'YAMINOV, B.A.; GORBATSKIY, V.G.; DEYCH,  
A.N.; KRAT, V.A.; MEL'NIKOV, O.A.; SOBOLEV, V.V.; MIKHAYLOV, A.A.,  
otv. red.; KULIKOV, G.S., red.; AKSEL'ROD, I.Sh., tekhn. red.

[Course on astrophysics and stellar astronomy] Kurs astrofiziki i  
zvezdnoi astronomii. 2. izd. Moskva, Fizmatgiz. Vol.2. [By] T.A.  
Agekian i dr. 1962. 688 p. (MIRA 16:1)  
(Astrophysics) (Stars) (Nebulae)

SHCHEGLOV, Petr Vladimirovich; KULIKOV, G.S., red.; PLAKSHE, L.Yu.,  
tekhn. red.

[Electronic telescope] Elektronnaya teleskopiia. Moskva, Fiz-  
matgiz, 1963. 194 p. (MIRA 16:10)  
(Electron optics) (Telescope)

VORONTSOV-VEL'YAMINOV, Boris Aleksandrovich, prof.; KULIKOV, G.S.,  
red.; BRUDNO, K.F., tekhn. red.

[Collection of problems and exercises in astronomy] Sbornik  
zadach i uprazhnenii po astronomii. Izd.5. Moskva, Fizmat-  
giz, 1963. 279 p. (MIRA 16:9)  
(Astronomy--Problems, excercises, etc.)



GORBATSKIY, V.G.; MININ, I.N.; ; AMBARTSUMYAN, V.A., red.; BUSTEL',  
E.R., red.; SEVERNYI, A.B., red.; SOBOLEV, V.V., red.;  
KULIKOV, G.S., red.; AKSEL'ROD, I.Sh., tekhn. red.

[Nonstable stars] Nestatsionarnye zvezdy. Moskva, Fizmatgiz,  
1963. 355 p. (MIRA 16:4)

(Stars, Variable)

VYAZANITSYN, V.P. [deceased]; GNEVYSHEV, M.N.; DOBROVOL'SKIY, O.V.;  
KRAT, V.A.; MARKOV, A.V.; MOLCHANOV, A.P.; SCBOLEV, V.M.;  
SHARONOV, V.V.; DEYCH, A.N., red.; MEL'NIKOV, O.A., red.;  
KULIKOV, G.S., red.

[Course of astrophysics and stellar astronomy] Kurs astrofi-  
ziki i zvezdnoi astronomii. Moskva, Izd-vo "Nauka." Vol.3.  
1964. 375 p. (MIRA 17:5)

VORONTSOV-VEL'YAMINOV, Boris Aleksandrovich; KULIKOV, G.S., red.

[Essays on the universe] (Cherki o Vselennoi. Izd. 5., dop.  
Moskva, Izd-vo "Nauka," 1964. 552 p. (MIRA 17:5)

TREYFEL', Viktor Germanovich; KULIKOV, G.S., red.

[Giant planets] Planety-giganty. Moskva, Izd-vo "Nauka,"  
1964. 84 p. (Populiarnye lektsii po astronomii, no.13)  
(MIRA 17:6)

ZIGAL', Feliks Yur'yevich; KULIKOV, G.S., red.

[Treasures of the stellar sky; guide to the constellations] Sokrovishcha zvezdnogo neba; putevoditel' po zvezdam. Moskva, Nauka, 1964. 221 p. (MIRA 17:9)

GIL'ZIN, Karl Aleksandrovich; KULIKOV, G.S., red.

[Electrical interplanetary vehicles] Elektricheskie mezh-  
planetnye korabli. Moskva, Nauka, 1964. 317 p.  
(MIRA 17:11)

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chenie Solntsa i planet. Moskva, Nauka, 1964. 560 p.  
(MIRA 18:1)

NOVIKOV, Igor' Dmitriyevich; SHISHAKOV, Vitaliy Alekseyevich;  
KULIKOV, G.S., red.

[Homemade astronomical instruments and observations with  
them] Samodel'nye astronomicheskie instrumenty i nabliu-  
deniya s nimi. Moskva, Nauka, 1965. 122 p.  
(MIRA 18,5)



SHARONOV, Vsevolod Vasil'yevich, prof. [deceased]; KULIKOV, G.S.,  
red.; BRONSHTEIN, V.A., red.

[The planet Venus] Planeta Venëra. Moskva, Nauka, 1965.  
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[Course in general astrophysics] Kurs obshchei astro-  
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KUKLIN, I.S., kand.tekhn.nauk; KULIKOV, G.S., inzh.

Main drawbacks in the use of the variation method for solving problems of haring coal deposits. Izv.vys.ucheb.zav.; gor. zhur. no.10:13-19 '58. (MIRA 12:8)

1. Sverdlovskiy gornyy institut.  
(Coal mines and mining)

BODIAGIN, Mikhail Nikolayevich, kand. tekhn. nauk. Prinimal uchastiye  
KULIKOV, G.S., inzh.; BOYKO, A.A., otv. red.; OKHRIMENKO, V.A.,  
red. izd-va; PROZOROVSKAYA, V.L., tekhn. red.

[Mine ventilation] Provetrivanie shakht. Moskva, Gos.nauchno-  
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(Mine ventilation)

KULIKOV, Georgiy Stepanovich; BODYAGIN, M.N., kand. tekhn. nauk; SEREBIYANYI,  
A.G., otv. red.; OKHRIMENKO, V.A., red. izd-va; BOLDYREVA, Z.A., tekhn.  
red.

[Reference book on ventilation; for lower technical specialists in  
mines] Spravochnik po ventiliatsii; dlia mladshogo tekhnicheskogo nad-  
zora shakht i rudnikov. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po  
gornomu delu, 1961. 239 p. (MIRA 14:7)  
(Mine ventilation)

KULIKOV, Georgiy Stepanovich. Prinimal uchastiye BODYAGIN, M.N., kand.  
tekhn. nauk; OKHRIMENKO, V.A., ctv. red.; IL'INSKAYA, G.M.,  
tekhn. red.

[Engineering calculations in solving mine ventilation problems]  
Inzhenernye raschety pri reshenii voprosov ventilatsii shakht.  
Moskva, Gosgortekhnizdat, 1962. 65 p. (MIRA 15:4)  
(Mine ventilation)

KULIKOV, G.S., inzh.

"Ventilation of coal mines" by N.F.Kremenchutskii. Reviewed by  
G.S.Kulikov. Bezop.truda v prom. 6 no.12:32 D '62.  
(MIRA 15:12)  
(Mine ventilation) (Kremenchutskii, N.F.)

KUKLIN, I.S.; KULIKOV, G.S.; PADUCHEVA, A.V.

Pressure of a hydraulic giant jet on a flat wall. Trudy Inst. gor. dela  
UFAN SSSR no.3:87-90 '62. (MIRA 16:3)

(Hydraulic mining—Equipment and supplies) (Jets—Fluid dynamics)



SHAVRIN, S.V. (Sverdlovsk); ZAKHAROV, I.I. (Sverdlovsk); KULIKOV, G.S.  
(Sverdlovsk)

Reduction of an iron oxide melt by carbon. Izv. AN SSSR. Met.  
i gor. delo no.1:26-31 Ja-F '64. (MIRA 17:4)

KULIKOV, G.S.

CARD 1 / 2

PA - 1950

SUBJECT

USSR / PHYSICS

AUTHOR

BOLTAKS, V.I., KULIKOV, G.S.

TITLE

On the Diffusion of Indium Antimony and Tellurium in Indium-Antimonide.

PERIODICAL

Zhurn.techn.fiz., 27, fasc.1, 82-84 (1957)  
Issued: 2 / 1957

The present work contains experimental data concerning the coefficients of this diffusion. The authors carried out these investigations on monolithic coarse-grained bars of InSb, which were produced from chemically pure components. The diffusion coefficients were measured by the usual method of the successive removal of layers and by using the radioactive isotopes In-114, Sb-124 and Te-127 as indicators. Diffusion-annealing was carried out at various temperatures within the interval of 300 - 500° C; the duration of this annealing varied according to temperatures from 50 to 180 hours.

A diagram illustrates the dependence  $\lg D = f(1/T)$  obtained at various temperatures of diffusion annealing. Here D denotes the diffusion coefficient and T - the temperature of annealing in K. Thus it was found that the coefficients of the diffusion of indium, antimony and tellurium change in InSb crystals on the occasion of the change of temperature according to the usual exponential law. The corresponding values of the most important diffusion parameters are given. These diffusion coefficients decrease at one and the same temperature of the diffusion annealing on the occasion of transition from In to Te and further to Sb. With increasing temperature this difference decreases. The extrapolation of the data ob-

Žurn.techn.fis,27,fasc.1,82-84 (1957)

CARD 2 / 2

PA - 1950

tained into the domain of higher temperatures shows that near the melting temperature of InSb the diffusion coefficients of In, Te and Sb have one and the same value. This is obviously a consequence of the sharp decrease of the amount of the potential barriers between the nodes of the crystal lattice near melting temperature. The differences of activation energy in connection with the diffusion of In, Te and Sb in InSb are closely connected with the mechanism of the influence exercised by these elements upon the electric properties of InSb. The introduction of an admixture of tellurium into InSb turns the hole-like conductivity into an electronic conductivity, and this change is due to the replacement of pentavalent antimony in the tetrahedron-like covalent binding of InSb by hexavalent tellurium. Like antimony, tellurium must diffuse along the vacant nodes.

The interpretation of the data concerning the diffusion of In in InSb is more complicated. Indium apparently does not diffuse in InSb along the vacant nodes, but along the domains located between the nodes in form of neutral atoms of positive ions. The influence exercised by the surplus of indium upon the character of the conductivity of InSb still remains to be investigated.

INSTITUTION: Institute for Semiconductors of the Academy of Science in the USSR, Leningrad

81767

S/181/60/002/02/01/033  
B006/B067

24.7700

AUTHORS: Boltaks, B. I., Kulikov, G. S., Malkovich, R. Sh.

TITLE: The Influence Exercised by Gold on the Electrical Properties of Silicon

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 2, pp. 181-191

TEXT: Gold belongs to those impurity elements which show low solubility and high diffusion rate in silicon. In the present article, the authors present the results of their investigations of the influence exercised by gold on the electrical properties of n-type and p-type silicon of different resistivity. First, the influence exercised by gold impurities on the resistivity of silicon is dealt with. The samples had a primary resistivity of 1.3-46 ohm.cm (n-type) and 0.5-87 ohm.cm (p-type). Gold was introduced partly by diffusion from gold vapors, partly by diffusion from a thin gold layer applied to the sample at temperatures of 1080-1380°C during 3-33 hours. The results are illustrated in a table and two diagrams. It was found that samples alloyed with gold in such a way show a relatively low-resistance surface layer; the electrical properties

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The Influence Exercised by Gold on the  
Electrical Properties of Silicon

S/181/60/002/02/01/033  
B006/B067

in the interior deviate considerably from those on the outer layer; the resistivity in the interior strongly increased, whilst the carrier concentration strongly decreased. In n-type Si resistivity attains  $\sim 10^5$  ohm.cm, in p-type Si,  $10^3 - 10^4$  ohm.cm; the electron and hole concentrations decrease to  $10^{10} - 10^{11} \text{ cm}^{-3}$  and  $10^{12} - 10^{13} \text{ cm}^{-3}$ , respectively. In the following, the carrier distribution is investigated with respect to the quantum states. Fig.3 shows a schematical representation of the distribution of the local levels. A large number of details are given. The width of the forbidden zone decreases with increasing temperature according to  $\Delta E = \Delta E_0 - \alpha T$ ;  $\alpha = 2 \cdot 10^{-4} \text{ ev/deg}$ ,  $\Delta E_0 = 1.21 \text{ ev}$ . The temperature dependence of the level of the chemical potential in n-type and p-type silicon was investigated for the two possible cases of temperature dependence of the activation energy. Data on n-type silicon are to be found in Fig. 4; Fig. 5 shows those obtained for p-type silicon. In the following, the plotting of the diagram which shows the dependence of resistivity on the gold concentration, is discussed. It was plotted by using all curves given in Figs. 4 and 5. It was found

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The Influence Exercised by Gold on the  
Electrical Properties of Silicon

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B006/B067

that by introducing gold, n-type Si can be transformed into p-type Si, that in the inverse case, however, by the introduction of gold into p-type Si, resistivity also increases without any change in the type of conductivity. The latter attains maximum resistivity at 291°K with

$4.6 \cdot 10^5$  ohm.cm. The experimental and theoretical data are briefly compared. In conclusion, the authors thank L. L. Korenblit for discussions. Mention is made of A. A. Shteynberg. There are 6 figures, 1 table, and 10 references: 6 Soviet, 2 American, 1 German, and 1 Irish.

ASSOCIATION: Institut poluprovodnikov AN SSSR Leningrad (Institute of Semiconductors of the AS USSR, Leningrad)

SUBMITTED: April 16, 1959

X

Card 3/3

84586

S/181/60/002/010/008/051  
B019/B070

9.4310 (2104,1143,1160)

AUTHORS: Boltaks, B. I., Kulikov, G. S., and Malkovich, R. Sh.

TITLE: Electric Transport of Gold in Silicon 11

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 10, pp. 2395-2399

TEXT: A thin layer of gold (Au-198) was laid on to the polished surfaces of two silicon samples (5.5.2 mm) which were then pressed together. The whole was placed in a water-cooled chamber filled with helium (Fig. 1). Heating was done by direct current which also served to produce the electric field necessary for the transport of gold. The temperature was measured by an optical pyrometer. Experiments were made in the temperature range 1075 - 1350°C. It was found that in the temperature range from 1075°C to about 1280°C, the gold in silicon migrates preferably to the cathode. At higher temperatures, the direction of transport is reversed (Fig. 3). It is considered improbable that this phenomenon is due to the change in the ionization character of the gold atom. It is rather surmized that the observed phenomenon is due to the associated motion of the ions with the electrons. According to V. B. Fiks, an impurity ion in a metal

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84586

Electric Transport of Gold in Silicon

S/181/60/002/010/008/051  
B019/B070

or semiconductor moves under the action of two different forces. The first force is due to the electric field and the second is due to the motion of the electrons toward the anode. The experimentally determined value of the mobility of gold in silicon as a function of temperature is graphically shown in Fig. 4. The values were obtained from a measurement of the rise of p-n junction with radioactive gold. The results obtained here are in good agreement with those calculated by Fiks (Ref. 4). It is established that the associated motion of gold atoms with electrons plays an important role in the transport of gold in silicon. The following values were obtained for the diffusion coefficient: in the temperature range 1200-1370°C about  $4 \cdot 10^{-7}$  -  $4 \cdot 10^{-6}$  cm<sup>2</sup>/sec, at 900°C about  $5 \cdot 10^{-10}$  cm<sup>2</sup>/sec, and at 1088°C about  $4 \cdot 10^{-8}$  cm<sup>2</sup>/sec. Also the solubility of gold in silicon was studied with radioactive gold. The results obtained agree well with those of the other authors (Fig. 5). No difference in the solubility was found for different types of conductivity. There are 5 figures and 10 references: 4 Soviet, 5 US, and 1 ?

ASSOCIATION: Institut poluprovodnikov AN SSSR Leningrad (Institute of Semiconductors of the Academy of Sciences USSR, Leningrad)

Card 2/3



Electric Transport of Gold in Silicon

S/181/60/002/010/008/051  
B019/B070

SUBMITTED: March 23, 1960

Card 3/3

X

KAPLAN, Samuil Aronovich; PIKEL'NER, Solomon Borisovich;  
AMBARTSUMYAN, V.A., red.; MUSTEL', E.R., red.; SEVERNYY,  
A.B., red.; SOBOLEV, V.V., red.; KULIKOV, G.S., red.;  
AKSEL'ROD, I.Sh., tekhn. red.

[Interstellar medium] Mezhzvezdnaya sreda. Moskva, Fiz-  
matgiz, 1963. 531 p. (MIRA 17:2)

ACCESSION NR: AP4041688

S/0181/64/006/007/1925/1929

AUTHORS: Boltaks, B. I.; Kulikov, G. S.

TITLE: Diffusion of silver on the surface of silicon

SOURCE: Fizika tverdogo tela, v. 6, no. 7, 1964, 1925-1929

TOPIC TAGS: silver, silicon, diffusion, transport process, surface diffusion, autoradiography

ABSTRACT: Free diffusion and electron transport of silver on a silicon surface was investigated by an autoradiographic method in order to determine the kinetics of these processes. The object of the investigation was single-crystal n-type silicon and the diffusion was investigated on the (100), (110), and (111) crystallographic planes in the temperature range 300--1000C. Ag-110 was used as the radioactive tracer. Two batches of samples (parallelepipeds measuring ~3 x 5 x 20 mm) were tested -- with ground and with chemically

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ACCESSION NR: AP4041688

polished surfaces. The test procedure is described. The results show that the coefficient of diffusion of silver over a polished silicon surface depends on the crystallographic orientation of the surface, but diffusion over a ground surface displays no such dependence. The diffusion coefficient in either case has an exponential time dependence. An increase in the dislocation density leads to an abrupt increase in the rate of diffusion of silver on the silicon surface, with accumulations of silver clustering in the regions with maximum dislocation density. Tests of the diffusion of silver in a constant electric field have shown that the silver on the surface is in the form of neutral atoms and partially in the form of negative ions. This, together with the data on the effect of the dislocations on the surface diffusion, points to a vacancy mechanism of silver diffusion on silicon. Orig. art. has: 6 figures and 1 table.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors, AN SSSR)

Card 2/5

ACCESSION NR: AP4041688

SUBMITTED: 20Nov63

DATE ACQ:

ENCL: 02

SUB CODE: SS

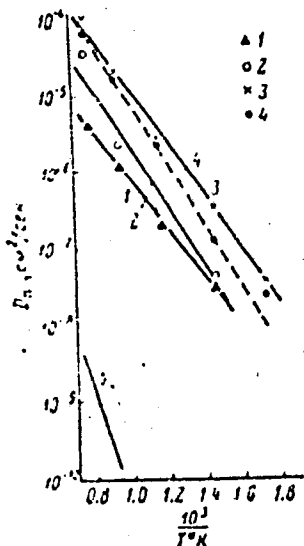
NR REF SOV: 005

OTHER: 000

Card 3/5

ACCESSION NR: AP4041688

ENCLOSURE: 01



Temperature dependence of the coefficient  
of surface diffusion of silver for different  
crystallographic planes  
1 - (110), 2 - (111), 3 - (100), 4 - (110), (111), (100),  
5 - volume diffusion

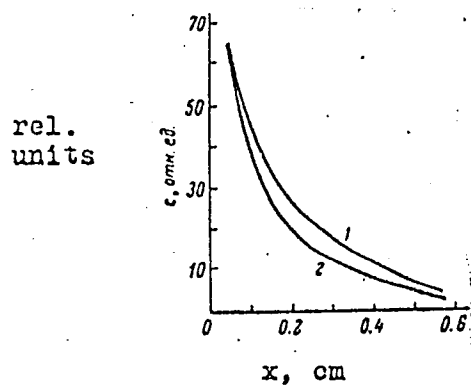
1--3 - polished surfaces, 4 - ground

All points are averages for two or three samples

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ACCESSION NR: AP4041688

ENCLOSURE: 02



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BOLTAKS, B.I.; KULIKOV, G.S.

Diffusion of silver on a silicon surface. Fiz. tver. tela 6 no.7:1925-  
1929 J1 '64. (MIRA 17:10)

1. Institut poluprovodnikov AN SSSR, Leningrad.



KULIKOV, G.S.

Study of diffusion in semiconductors; all-Union conference.  
Vest. AN SSSR 35 no.4:97-98 Ap '65. (MIRA 18:6)

ACC NR: AP6036982 (A,N) SOURCE CODE: UR/0181/66/008/011/3344/3349

AUTHOR: Kulikov, G. S.; Givargizov, Ye. I.

ORG: Institute of Semiconductors AN SSSR, Leningrad (Institut poluprovodnikov AN SSSR)

TITLE: Diffusion of antimony in epitaxial layers of germanium

SOURCE: Fizika tverdogo tela, v. 8, no. 11, 1966, 3344-3349

TOPIC TAGS: germanium, antimony, metal film, epitaxial growing, physical diffusion, crystal defect

ABSTRACT: The purpose of the investigation was to ascertain the extent to which the nature of diffusion in epitaxial layers differs from diffusion in single crystals grown from the melt, since it is known that the crystal defects produced in the two growing mechanisms are different. Antimony was chosen as the diffusing impurity. The epitaxial layers were grown by the chloride method on substrates of single-crystal germanium oriented along the (111) plane. The epitaxial layer thickness was 130 - 300  $\mu$ . Two groups of epitaxial layers, grown at 880 and 720C respectively, were tested. The diffusion was measured by using radioactive  $Sb^{124}$  and by the method of removal of layers and autoradiography. The tests were made in the temperature range 500 - 900C. Both diffusion within the volume of the epitaxial layers and over the imperfections of these layers were investigated. The volume diffusion differed little from that of diffusion in single-crystal germanium. The diffusion over the

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ACC NR: AP6036982

structural imperfections was much faster than within the volume, and the activation energy was lower. The difference between the diffusion coefficients in the volume and over the imperfections amounts to 3 - 7 orders of magnitude within the indicated temperature interval. It is concluded that structural imperfections in the epitaxial layer can noticeably distort the front of the volume diffusion of the impurities and deteriorate the quality of semiconductor devices made by epitaxial growing. On the other hand, the strong difference in the diffusion coefficients within the volume and over the boundaries of the defects (stacking faults) can serve as a method of producing semiconductor systems in which the p-n junctions are located at places where the epitaxial layers have structural imperfections. The authors thank B. I. Boltaks and N. N. Sheftal' for a discussion of the work and E. P. Savin for help with the measurements. Orig. art. has: 6 figures, 2 formulas, and 1 table.

SUB CODE: 20/ SUBM DATE: 03Feb66/ ORIG REF: 005/ OTH REF: 001

Card -2/2

ACC NR: AP7006199

(A)

SOURCE CODE: UR/0363/67/003/001/0026/0028

AUTHOR: Kulikov, G. S.; Boltaks, B. I.; Savin, E. P.

ORG: Institute of Semiconductors, Academy of Sciences, SSSR (Institut poluprovodnikov Akademii nauk SSSR)

TITLE: Diffusion of phosphorus through an oxide film in silicon

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 3, no. 1, 1967, 26-28

TOPIC TAGS: phosphorus, silicon dioxide, silicon, physical diffusion

ABSTRACT: In order to determine the causes of the masking effect of oxide films on the surface of silicon, experiments were conducted on the diffusion of phosphorus in oxide layers and also in silicon through oxide layers of various thicknesses. Diffusion coefficients measured for phosphorus in quartz as an analog of an oxide film on silicon, and also values of the activation energy and preexponential factor  $D_0$  indicate that starting at 1000°C and above, the diffusion coefficient of phosphorus in silicon dioxide is smaller than in silicon. The masking effect of oxide layers on silicon during the diffusion of phosphorus (for moderate times) is due to a limitation of the concentration of the diffusing impurity on silicon under the oxide layer. This is caused by the small value of the diffusion coefficient of phosphorus in  $\text{SiO}_2$  as compared to diffusion in silicon. The masking effect also arises in the diffusion of elemental phosphorus and when the source of the diffusion is phosphorus

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UDC: 546.18:532.72:546.28

ACC NR: AP7006199

pentoxide. At 1100°C (source temperature 325°C) and a diffusion time of 6 hr, a good masking effect is provided by oxide layers 0.6 micron thick. Orig. art. has: 5 figures.

SUB CODE: 07,20/ SUBM DATE: 13Dec65/ OTH REF: 004

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**"APPROVED FOR RELEASE: 08/23/2000**

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**APPROVED FOR RELEASE: 08/23/2000**

**CIA-RDP86-00513R000927420008-9"**

AUTHOR: Kulikov, G.V., Engineer

SOV/122-58-6-3/37

TITLE: On the Power Losses in M.L. Novikov Gear Trains (O poteryakh v zatseplenii M.L. Novikova)

PERIODICAL: Vestnik Mashinostroyeniya, 1958, Nr 6, pp 11 - 16 (USSR)

ABSTRACT: At present, gear transmission with Novikov tooth forms are made with line contact along the height of the tooth in the normal plane. The paper examines the effect of the basic design parameters of the tooth form on the power losses and is confined to line contact meshing. The basic design parameters are the relative shift of the point of contact, the pitch angle of the tooth helix, and the pressure angle. Among the several factors which determine losses, the most important is the thickness of the oil layer between the working surfaces in contact. This thickness depends on the radii of curvature of the co-operating surfaces, the nature of their relative movement and the speed of this movement. In Novikov gears, the relative movement consists of rolling along the contact line, sliding and rotation. The velocities of these three motions depend upon the basic parameters in the manner expressed by Eq.s(1) and (2) for the linear speed of the contact point

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On the Power Losses in M.L. Novikov Gear Trains

along the pinion contact line and the wheel contact line, respectively, by Eq.(3) for the sliding velocity and by Eq.(4) for the relative rotation. The effective velocities assisting the creation of an oil layer are the rolling velocities along the contact line. The distinguishing property of the Novikov gear engagement is the larger than usual magnitude of these velocities and of the radii of curvature of the conjugate surfaces as well as their substantial dependence on the parameters of the engagement. The main design parameter which affects the rolling velocities is the helix angle. Although the sliding velocity in Novikov gears is larger than in involute gears, compared with the rolling velocity along the line of contact it is much smaller. It is stated that this relative value is the factor which controls the losses. The radius of the equivalent cylinder, which equally affects the creation of the oil layer also changes mainly with the helix angle, for example, by a factor of 4 when the helix angle changes from  $60^\circ$  to  $75^\circ$ . It is concluded that hydrodynamic lubrication can be expected with a greater thickness of the oil layer than in involute gears. Referring to the Kapitza theory of

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hydraulic lubrication in rolling contact (Zhurnal Tekhnicheskoy Fiziki, 1955, Nr 4), a simplified solution of the problem for the Novikov tooth form is developed similar to an existing solution applicable to involute gears. Neither the normal force between the conjugate tooth surfaces nor the sliding friction coefficient between them vary in time in the Novikov gear, whilst they vary periodically in involute gears. An approximate theory for ideally accurate gears leads to a formula (Eq.(9)) for the power loss coefficient expressed in terms of the friction coefficient and the basic design parameters of the gear transmission. Conversely, experimentally found losses can be used to determine a friction coefficient. Figures 6 and 7 show the friction coefficient plotted against the helix angle and the shift of the contact point computed from experimentally found losses. Such experiments were carried out in a special rig, diagrammatically shown in Figure 8, which permits the separation of bearing losses from those in the tooth contacts. The rig consists of two identical gear boxes coupled by shafts and spline couplings. The two gear boxes constitute

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a closed loop gear train for the two pairs of gears under test. An additional gear train serves for the rotation of the outer races of the relevant bearings with the angular velocity of the shafts on which the pairs of gears under investigation are mounted. Thus, both the inner and outer races of the bearings in the closed circuit rotate at the same speed, being both driven by synchronous motors. The gears were made with circular profile disc cutters and some additional lapping with paste was necessary to approximate the desired profile. The wear of the working surfaces reduces the individual pitch error and the accumulated pitch error by about one-third of the amount of wear. In a closed contour rig, one pair of gears is speed-reducing and the other speed-increasing. With the Novikov gear engagement, this means a different type of contact and different efficiencies, because the speed-increasing pair has an interpole engagement which is more sensitive to manufacturing accuracy. One pair in the rig was therefore made with involute teeth, whose efficiency was previously determined experimentally. The conclusions from the test are broadly that Novikov gears have half the losses of

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involute gears. In gears of 180 Brinell hardness, a load of 5 000 kg/cm<sup>2</sup>, a peripheral speed of 8.8 m/sec, a 7-th grade surface finish and a 4th grade profile accuracy, the efficiency lies between 99 and 99.5%. With rising load and speed, the efficiency rises marginally. The pressure angle has little influence on the efficiency. The contact point shifts could be chosen between 0.05 and 0.035 without tendency to seize. An increasing helix angle increases the losses to some extent. There are 9 figures and 4 Soviet references.

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1. Transmission gears--Design 2. Transmission gears--Mechanical properties 3. Transmission gears--Mathematical analysis